

# THE CARL MOYER PROGRAM GUIDELINES PROPOSED REVISIONS 2005

## WORKSHOP

August 19  
Sacramento

On-Road Controls Branch  
Mobile Source Control Division



CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY



Air Resources Board

# Webcast Communication Information

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- ◆ Please send questions and comments to:
  - Email address: [OnAir@arb.ca.gov](mailto:OnAir@arb.ca.gov)

# Today's Agenda

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- ◆ Carl Moyer Program Background
- ◆ Agricultural Sources
- ◆ Agricultural Assistance Program
- ◆ Voluntary Accelerated Vehicle Retirement
- ◆ Open Discussion

# Carl Moyer Program

## Background

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- ◆ Provides grants to offset the incremental cost of lower emitting technologies
- ◆ Early introduction of low-emission technologies
- ◆ Carl Moyer Program's objective
  - Improve air quality
  - Supplement, not replace, regulations

# Carl Moyer Program

## Core Principles

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- ◆ A state and local partnership
  - ARB sets guidelines
  - Local districts receive applications, make grants, and monitor projects
- ◆ Emission reductions must be real, quantifiable, surplus, and enforceable
- ◆ Environmental justice funding requirement

# Carl Moyer Program

## Eligible Emission Reductions

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- ◆ Emission reductions must be real, quantifiable, surplus, and enforceable
  - Certified engines and/or verified retrofit kits
  - Cannot be used in alternative compliance strategies (e.g., ABT)
  - Cannot be used to comply with other regulations (e.g., fleet rules)
  - Cannot be used to comply with legally binding agreements (e.g., MOUs)

# Carl Moyer Program Changes

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- ◆ Increased and continued funding
  - Adjustment to Smog Check and tire fees through 2015
  - Local districts may increase motor vehicle registration surcharge by \$2
- ◆ Program expansion
  - Add PM and ROG
  - Add light-duty vehicles
  - Add agricultural sources (HSC 39011.5)
  - Add fleet modernization program

# Cost-Effectiveness

## Proposed Formula

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◆ Cost-Effectiveness (\$/ton) =

$$\frac{\text{Annualized Cost}}{\text{NOx} + \text{ROG} + (\text{WF} * \text{PM}_c)}$$

Where:

NOx	= Annual NOx emissions (tpd)
ROG	= Annual ROG emissions (tpd)
PM <sub>c</sub>	= Combustion PM (tpd)
WF	= weighting factor

- ◆ WF may be based on many factors
- ◆ Range of weighting factor for PM<sub>c</sub>: 10 - 30
- ◆ Non-combustion PM not included
  - Guidelines criteria not available for non-combustion PM projects



# Schedule

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- ◆ Workshops on Carl Moyer Guideline Revisions
  - November/December 2004
  - April/May 2005
  - August 2005
- ◆ Release Proposed Project Criteria -- August 2005
- ◆ Release Proposed Guidelines -- Oct 2005
- ◆ Board Hearing -- Nov 2005

# Carl Moyer Program

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## Agricultural Sources Project Criteria

# Agricultural Sources

## Background

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- ◆ Previous funding for self-propelled equipment, irrigation pump engines/motors
- ◆ AB 923 expanded agricultural projects eligible for funding:
  - Confined animal facilities
  - Internal combustion engines (not self-propelled)
  - Title V sources
  - Sources subject to district regulation

# Agricultural Sources

## Project Criteria

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- ◆ General Requirements
  - Early or extra emission reductions
  - Cost-effectiveness of \$14,300/weighted ton
  - Project life of at least 3 years

*See project criteria handout for a complete list of proposed criteria*

# Agricultural Sources

## Project Criteria- Stationary/Portable Engines

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- ◆ Engines greater than 25 hp
- ◆ Repowers of diesel engines
  - Electric
  - New certified diesel or SI engine
  - New SI engine with emissions below district requirements
- ◆ Repowers of spark-ignited (SI) engines
  - Electric
  - New certified SI engine
  - New SI engine with emissions below district requirements

*See project criteria handout for a complete list of proposed criteria*

# Agricultural Sources

## Project Criteria- Stationary/Portable Engines

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- ◆ Uncertified SI engine projects
  - Subject to ARB staff approval
  - Must include closed-loop fuel system and three-way catalyst
  - Source testing every 2 years
  - Quarterly (with exceptions) NO<sub>x</sub> and HC emission readings using portable analyzer
  - Costs associated with testing and monitoring not eligible for funding

*See project criteria handout for a complete list of proposed criteria*

# Agricultural Sources

## Electric Motor Projects

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- ◆ Districts must give priority to projects that replace stationary agricultural engines with electric motors
- ◆ Electric motor projects may use a 10 year project life
- ◆ Necessary equipment associated with motor is eligible for funding

*See project criteria handout for a complete list of proposed criteria*

# Agricultural Sources

## Electric Motor Projects

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- ◆ Some utilities offering special rate and credit for line extension for electric ag pumps
  - Limited time offer
- ◆ Propose to extend project life for current Moyer-funded IC engines that opt for limited time electric rate
- ◆ Propose to reduce engine rebuild cost for non-Moyer-funded IC engines that opt for limited time electric rate
- ◆ Districts may use match funds for additional line extension costs



# Agricultural Sources

## Project Criteria- Non-Engine Projects

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- ◆ No criteria proposed at this time
- ◆ Continue to monitor potential control technologies:
  - Real, quantifiable, enforceable emission benefits
  - Availability of testing methods for quantifying emission benefits
  - Availability of baseline emission factors
- ◆ Propose to allow EO approval of project criteria

*See project criteria handout for a complete list of proposed criteria*

# Agricultural Sources

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## Criteria Discussion

Email address: [OnAir@arb.ca.gov](mailto:OnAir@arb.ca.gov)

# Agricultural Sources

## Sample Calculation – Irrigation Pump Engine Repower

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### Existing engine information:

- ◆ 1991 Caterpillar 3116, diesel
- ◆ Emission rate (g/bhp-hr): 7.6 NO<sub>x</sub>, 0.67 ROG, 0.27 PM,
- ◆ Activity: 2,000 hr/yr
- ◆ Engine horsepower: 155 hp
- ◆ Load factor: 0.65

### Reduced-emission engine information:

- ◆ 2005 GE 5K445FT328, electric
- ◆ Emission rate (g/bhp-hr): 0.0 NO<sub>x</sub>, 0.0 ROG, 0.0 PM
- ◆ Activity: 2,000 hp
- ◆ Engine horsepower: 100 hp (75 kW)
- ◆ Load factor: 0.65

# Agricultural Sources

## Sample Calculation – Irrigation Pump Engine Repower

### Emissions Calculation – Baseline

- ◆  $\text{NO}_x = (7.6 \text{ g/bhp-hr} \times 2,000 \text{ hr/yr} \times 155 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 1.69 ton/yr
- ◆  $\text{ROG} = (0.67 \text{ g/bhp-hr} \times 2,000 \text{ hr/yr} \times 155 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0.15 ton/yr
- ◆  $\text{PM} = (0.27 \text{ g/bhp-hr} \times 2,000 \text{ hr/yr} \times 155 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0.06 ton/yr

### Emissions Calculation – Reduced Emissions

- ◆  $\text{NO}_x = (0.0 \text{ g/bhp-hr} \times 2,000 \text{ hr/yr} \times 100 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0 ton/yr
- ◆  $\text{PM} = (0.0 \text{ g/bhp-hr} \times 2,000 \text{ hr/yr} \times 100 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0 ton/yr
- ◆  $\text{ROG} = (0.0 \text{ g/bhp-hr} \times 2,000 \text{ hr/y} \times 100 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0 ton/yr

# Agricultural Sources

## Sample Calculation – Irrigation Pump Engine Repower

- ◆  $\text{NO}_x \text{ Reductions} = 1.69 \text{ ton/yr} - 0 \text{ ton/yr}$   
 $= 1.69 \text{ ton/yr}$
- ◆  $\text{ROG Reductions} = 0.15 \text{ ton/yr} - 0 \text{ ton/yr}$   
 $= 0.15 \text{ ton/yr}$
- ◆  $\text{PM Reductions} = 0.06 \text{ ton/yr} - 0 \text{ ton/yr}$   
 $= 0.06 \text{ ton/yr}$

# Agricultural Sources

## Sample Calculation – Irrigation Pump Engine Repower

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- ◆ Project Life = 7 years → CRF = 0.167
- ◆ Incremental cost =  
$$\$26,700 - \$7,000/2 = \$23,200$$
- ◆ Annualized cost =  
$$\$23,200 * 0.167 = \$3,874/\text{yr}$$
- ◆ Project cost-effectiveness =  
$$(\$3,874/\text{yr})/[1.69 \text{ ton NOx/yr} + 0.15 \text{ ton ROG/yr} + 10*0.06 \text{ ton PM/yr}]$$
  
**= \$1,588/weighted surplus ton**

# Agricultural Sources

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## Sample Calculation Discussion

Email address: [OnAir@arb.ca.gov](mailto:OnAir@arb.ca.gov)

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# Agricultural Assistance Program



# Agricultural Assistance Program

## Background

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- ◆ Funded by \$2 motor vehicle fee collected by some districts
- ◆ Projects from “previously unregulated” agricultural sources of air pollution
  - Minimum of 3 years from adoption of rule or until compliance date, whichever comes first
  - Reductions do not need to be surplus

# Agricultural Assistance Program

## Background (cont.)

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- ◆ Statutory guidance: projects must follow Carl Moyer Program guidelines
  - Incremental cost
  - Use Carl Moyer Program project criteria
  - No infrastructure costs
- ◆ Cost-effectiveness based on total (not surplus) reductions:

Annualized Cost (\$/year)

Emission Reductions if no Regulatory Req. Existed  
(tons/yr)

# Agricultural Assistance Program

## Project Criteria- Stationary/Portable Engines

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- ◆ Engines greater than 25 hp
- ◆ Repowers of diesel engines
  - Electric
  - New certified diesel or SI engine
  - New SI engine with emissions meeting or below district requirements
- ◆ Repowers of SI engines
  - Electric
  - New certified SI engine
  - New SI engine with emissions meeting or below district requirements

*See project criteria handout for a complete list of proposed criteria*

# Agricultural Assistance Program

## Project Criteria- Stationary/Portable Engines

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- ◆ Uncertified SI engine projects
  - Subject to ARB staff approval
  - Must include closed-loop fuel system and three-way catalyst
  - Source testing every 2 years
  - Quarterly (with exceptions) NOx and HC emission readings using portable analyzer
  - Costs associated with testing and monitoring not eligible for funding

*See project criteria handout for a complete list of proposed criteria*

# Agricultural Assistance Program

## Electric Motor Projects

---

- ◆ Some utilities offering special rate and credit for line extension for electric ag pumps
  - Limited time offer
- ◆ Propose to extend project life for current Moyer-funded IC engines that opt for limited time electric rate
- ◆ Propose to reduce engine rebuild cost for non-Moyer-funded IC engines that opt for limited time electric rate
- ◆ Districts may use match funds for additional line extensions costs

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# Agricultural Assistance Program

## Project Criteria- Non-Engine Projects

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- ◆ No criteria proposed at this time
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  - Real, quantifiable, enforceable emission benefits
  - Availability of testing methods for quantifying emission benefits
  - Availability of baseline emission factors
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*See project criteria handout for a complete list of proposed criteria*

# Agricultural Assistance Program

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## Criteria Discussion

Email address: [OnAir@arb.ca.gov](mailto:OnAir@arb.ca.gov)

# Agricultural Assistance Program

## Sample CETR Calculation

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District Rule: Compliance by January 1, 2007

Existing engine information:

- ◆ 1977 John Deere JD6466A
- ◆ Emission rate (g/bhp-hr): 11.2 NO<sub>x</sub>, 0.94 ROG, 0.40 PM
- ◆ Activity: 3,000 hr/yr
- ◆ Engine horsepower: 182 hp
- ◆ Load factor: 0.65

Reduced-emission engine information:

- ◆ 2005 John Deere 6068HF275-225
- ◆ Emission rate: 4.2 NO<sub>x</sub>, 0.12 ROG, 0.09 PM
- ◆ Activity: 3,000 hr/yr
- ◆ Engine horsepower: 184 hp
- ◆ Load factor: 0.65

*Draft – Do not cite or quote – numbers may change*



# Agricultural Assistance Program

## Sample CETR Calculation

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### Emissions Calculation – Baseline

- ◆  $\text{NO}_x = (11.2 \text{ g/bhp-hr} \times 3,000 \text{ hr/yr} \times 182 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 4.38 ton/yr
- ◆  $\text{ROG} = (0.94 \text{ g/bhp-hr} \times 3,000 \text{ hr/yr} \times 182 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0.37 ton/yr
- ◆  $\text{PM} = (0.40 \text{ g/bhp-hr} \times 3,000 \text{ hr/yr} \times 182 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0.16 ton/yr

### Emissions Calculation – Reduced Emissions

- ◆  $\text{NO}_x = (4.2 \text{ g/bhp-hr} \times 3,000 \text{ hr/yr} \times 184 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 1.66 ton/yr
- ◆  $\text{ROG} = (0.12 \text{ g/bhp-hr} \times 3,000 \text{ hr/yr} \times 184 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0.05 ton/yr
- ◆  $\text{PM} = (0.09 \text{ g/bhp-hr} \times 3,000 \text{ hr/yr} \times 184 \text{ hp} \times 0.65) / 907,200 \text{ g/ton}$   
= 0.04 ton/yr

# Agricultural Assistance Program

## Sample CETR Calculation

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- ◆ NOx Reductions = 4.38 ton/yr – 1.66 ton/yr  
= 2.72 ton/yr
- ◆ ROG Reductions = 0.37 ton/yr – 0.05 ton/yr  
= 0.32 ton/yr
- ◆ PM Reductions = 0.16 ton/yr – 0.04 ton/yr  
= 0.12 ton/yr

# Agricultural Assistance Program

## Sample CETR Calculation

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- ◆ Project Life = 7 years → CRF = 0.167
- ◆ Incremental cost =  
 $\$20,320 - \$3,500 = \$16,820$
- ◆ Annualized cost =  
 $\$16,820 * 0.167 = \$2,809/\text{yr}$
- ◆ Project cost-effectiveness =  
 $(\$2,809/\text{yr}) / [2.72 \text{ ton NO}_x/\text{yr} + 0.32 \text{ ton ROG}/\text{yr} + 10 * 0.12 \text{ ton PM}/\text{yr}]$   
**= \$663/weighted ton**

*Draft – Do not cite or quote – numbers may change*

# Agricultural Assistance Program

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CETR

Sample Calculation Discussion

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# Carl Moyer Program

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## Light-Duty Vehicles Project Criteria

# Light-Duty Vehicles

## Outline

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- ◆ Background
- ◆ Voluntary accelerated vehicle retirement regulations / proposed Moyer criteria
- ◆ South Coast remote sensing project
- ◆ Sample cost-effectiveness calculations

# Light-Duty Vehicles

## Background

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- ◆ AB923 brings light-duty vehicle projects into Carl Moyer Program
- ◆ Examples of light-duty projects
  - Voluntary accelerated vehicle retirement (VAVR or car scrapping)
  - Voluntary vehicle repair
- ◆ Remote sensing (RSD) technology to identify high emitters for voluntary retirement/repair

# Light-Duty Vehicles

## Why Light-Duty Vehicles?

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- ◆ Major contributor to ozone and PM pollution
  - 580 tpd ROG and 575 tpd NO<sub>x</sub> in 2005
  - 21% of all anthropogenic ozone precursors
- ◆ Pre-1990 models
  - 57% of ROG/41% of NO<sub>x</sub> from light-duty vehicles
  - 19% of population/13% of vehicle miles traveled



# Light-Duty Vehicles

## Steps for Adding Light-Duty Projects

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### 2005

- ◆ Allow projects that meet existing VAVR regulations
- ◆ Allow a limited South Coast remote sensing/retirement/repair program

### 2006

- ◆ Revise VAVR regulation and Moyer guidelines to fully integrate remote sensing
- ◆ Guidelines for vehicle repair projects

# Light-Duty Vehicles

## Introduction to VAVR

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- ◆ Retire older, more polluting vehicles earlier than their expected lifetime
- ◆ Participation is strictly voluntary
- ◆ Administered by districts, overseen by ARB
- ◆ VAVR regulations govern district programs
  - Title 13, California Code of Regulations, sections 2601 et seq.
- ◆ District programs complement BAR's vehicle retirement program

# Light-Duty Vehicles

## Basic VAVR Operations

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- ◆ Vehicles must meet functionality, equipment eligibility, and registration requirements
- ◆ Vehicles are disposed of by crushing so vehicle and its parts are unusable
- ◆ Scrap operations privately run
  - Districts contract with enterprise operators who evaluate and dispose of qualified vehicles

# Light-Duty Vehicles

## Car Collector Concerns

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- ◆ Enabling legislation requires VAVR programs to be sensitive to car collector concerns
- ◆ 10 day vehicle holding period to allow public opportunity to purchase
  - Entire vehicles or drive train parts may be sold, but no emission reductions claimed
  - Non-emission and non-drive train parts may be recovered from vehicles scrapped for credit

# Light-Duty Vehicles

## Moyer Criteria for VAVR Projects

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- ◆ Projects must comply with all provisions of the VAVR regulation
- ◆ Districts must submit plan to ARB before starting VAVR projects using Moyer funds
- ◆ Districts must report annually to ARB as part of required Moyer report
- ◆ Projects must meet cost-effectiveness limit
  - \$14,300 per weighted ton of ROG + NO<sub>x</sub> + PM

*See project criteria handout for a complete list of proposed criteria*

# Light-Duty Vehicles

## Vehicle Qualification Requirements

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- ◆ Currently registered by the DMV for at least 24 months in the district
  - Stricter than in the VAVR regulation (120 days) but consistent with Health & Safety Code §44094
- ◆ Must operate under its own power
- ◆ Must pass functionality and eligibility inspections described in VAVR regulation

# Light-Duty Vehicles

## Vehicle Requirements- Smog Check Status

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- ◆ Emission reductions must be surplus to Smog Check
- ◆ Vehicles must:
  - Not have failed a Smog Check if retired within 61 to 90 days of next inspection
  - Have passed the Smog Check if retired within 60 days of next scheduled inspection
  - Not be operating under a repair cost waiver

# Light-Duty Vehicles

## Record Keeping and Audits

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- ◆ Districts and enterprise operators must keep detailed records of all retired vehicles
- ◆ Records must be submitted to ARB as part of district's annual Moyer report
- ◆ ARB will conduct annual reviews of all district VAVR projects



# Light-Duty Vehicles

## Emission Reductions

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- ◆ Emission reductions must be calculated using methodology from VAVR regulation

$$\text{Reductions} = [\text{Emissions}_{\text{ret}} - \text{Emissions}_{\text{rep}}] \times [\text{Life}]$$

*Where:*

$\text{Emissions}_{\text{ret}}$  = average emission rate x average VMT of model year vehicle retired

$\text{Emissions}_{\text{rep}}$  = average emission rate of light-duty fleet x VMT of retired vehicle

Life = 3 years

- ◆ Emission factors and VMT from EMFAC
- ◆ Emission reduction table in guidance document

# Light-Duty Vehicles

## South Coast RSD/Retirement/Repair Project

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- ◆ Guidelines would authorize South Coast to run RSD program to ID higher polluting vehicles for voluntary retirement or repair
  - Data will be used to update VAVR regulation / Moyer guidelines to integrate RSD
  - Methodology for crediting emission reductions from RSD programs to be established
- ◆ South Coast AQMD to submit a detailed project plan to ARB

# Light-Duty Vehicles

## RSD Issues

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- ◆ Procedures to ensure proper RSD operation
- ◆ Emission reduction calculations
  - Converting RSD measurements to emission reductions
  - Ensuring benefits not double counted with Smog Check
- ◆ Proper use of Moyer/AB923 funds to pay for remote sensing

# Light-Duty Vehicles

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## Criteria Discussion

Email address: [OnAir@arb.ca.gov](mailto:OnAir@arb.ca.gov)

# Light-Duty Vehicles

## Sample Calculation

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- ◆ A district pays a total of \$750 to retire a 1980 model year light-duty vehicle in 2005
- ◆ Emission reductions over 3 year project life
- ◆ From Moyer Guideline Look-up Table:
  - ROG = 131 lb
  - NO<sub>x</sub> = 88 lb
  - PM = 0.9 lb

# Light-Duty Vehicles

## Sample Calculation

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- ◆ Annual Weighted Emission Reductions

$$= (131 + 88 + 10 \times 0.9) / 3 \text{ yrs} = 76 \text{ lb/yr}$$

- ◆ Annualized Cost

$$= \$750 \times 0.360 = \$270/\text{yr}$$

- ◆ Cost-effectiveness

$$= [\$270/\text{yr}] / [76 \text{ lb/yr}] \times [2000 \text{ lb/ton}]$$

$$= \text{\textbf{\$7,105/weighted surplus ton}}$$

# Light-Duty Vehicles

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## Sample Calculation Discussion

Email address: [OnAir@arb.ca.gov](mailto:OnAir@arb.ca.gov)

# Carl Moyer Program

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## Other Issues

Email address: [OnAir@arb.ca.gov](mailto:OnAir@arb.ca.gov)



# Carl Moyer Program

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- ◆ Please provide written comments by September 2, 2005
- ◆ For more information, visit the Carl Moyer Program web page
  - [www.arb.ca.gov/msprog/moyer/moyer.htm](http://www.arb.ca.gov/msprog/moyer/moyer.htm)

# Contact Information

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